

سلسلة مذكرات المتخصص



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فريق أصدقاء الكمبيوتر



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Chapter One: Digital Programs and Applications

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»» **Artificial intelligence** is not just one type, there are many different types. Imagine we have a big garden full of different flowers, each flower has a different shape and color, and so it is with artificial intelligence

»» Types of artificial intelligence:

Narrow AI	General AI	Super AI
Focuses on performing a specific task Examples: Face recognition or language translation Robot can play chess great, but he can't do it with anything else	He can do any task a human can do This type is more advanced Example A robot that perfectly mimics humans, can think, create, solve complex problems, learn and adapt to... Different situations	Exceeds human intelligence in all areas This type is the most advanced It can easily solve problems that are difficult for humans to solve. Discovering new things we never imagined

»» Applications of artificial intelligence in daily life:-

□ **Personal assistant** Assistant Like **Siri** or **Alexa**, It uses artificial intelligence to understand and carry out your commands.

□ **Smart Games** Some of these games use artificial intelligence to make the game more fun and challenging, as the characters in the game can learn from their mistakes and become more intelligent.



☐ Smart cars: Smart Cars

It is a car that drives itself without a driver. This is the dream of the future that is getting closer to being realized thanks to artificial intelligence.



☐ Digital Doctors

Doctors are using artificial intelligence to help them diagnose and treat diseases faster and more accurately.



☐ Instant Translator

Artificial intelligence can translate words and sentences instantly, which facilitates communication between people.

Translator

☐ Smart Shopping

Shopping sites offer you suggestions for products you might like. This is thanks to artificial intelligence. Which analyzes your previous purchasing behavior.



➤➤ Artificial intelligence fields

1- Machine learning – (Learning from mistakes):

Al has to learn new things, the more we show it a picture of a cat, the more it learns to name it, and the more we play a game with it, the smarter it becomes, this is called Machine Learning, and it is similar to when you learn to ride a bike, the more you fall, the better you learn how to balance.



Machine learning is like when you learn to ride a bike, every time you fall, you learn how to balance yourself better.

2- Natural Language Processing:- Can you imagine talking to your computer as if it were a friend? It understands our different languages and can answer our questions. This is Natural Language Processing, and it is like an intelligent language translator as it understands written and spoken human language, interprets it, and learns to "speak" human language.

3- Computervision – (see the world):-

Artificial intelligence can:

- * Looks at a picture and tells you everything about it
- * He can find your face in a crowded picture

*Distinguishing between images of different animals, which is called Computer Vision

4- Robotics:-

There are smart robots that do many tasks such as cleaning the house, playing chess, or performing complex and precise surgery, and they have the ability to work with great accuracy even in environments that are dangerous to humans

5- Simulation of human thinking and decision-making – (Expert systems:

Artificial intelligence can **solve complex problems** and **make difficult decisions**. This is the field of expert systems. It is similar to an intelligent doctor who can diagnose diseases.

6- Simulation of human learning – Deep Learning:

Deep learning aims to enable computer systems to **learn complex tasks** in a way similar to the way humans learn. Artificial intelligence has a mind similar to the human mind. It uses this mind to learn things very quickly. **Deep learning relies mainly on neural networks and deep learning.**

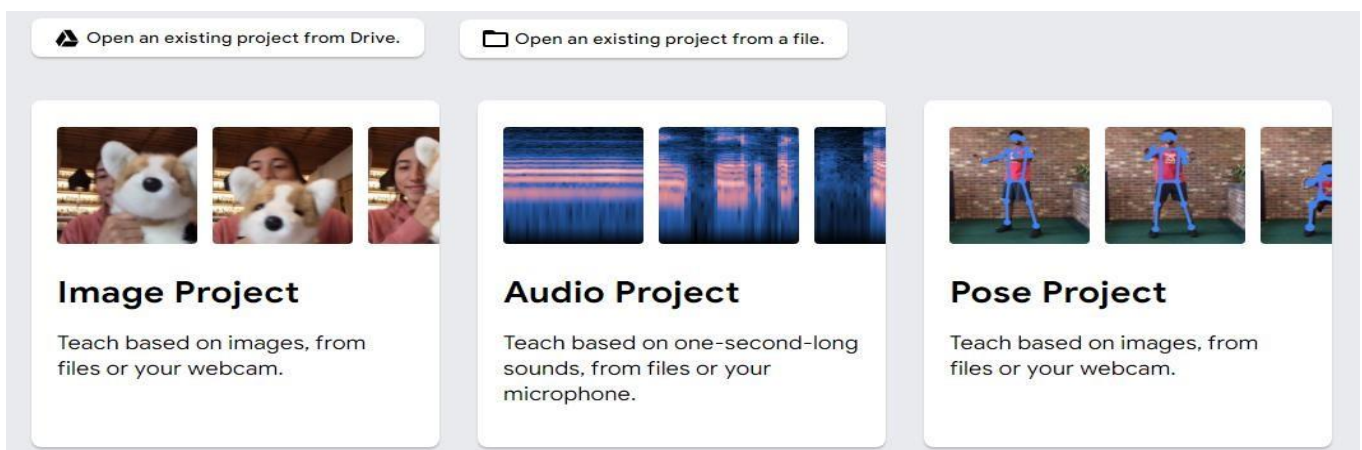
Model building training:

**** Create intelligent models to recognize images, sounds, and movements using machine learning**

**** Note :** It is preferable to update your Internet browser and work on Microsoft Edge browser

Click on the following link to enter the site

<https://teachablemachine.withgoogle.com>





Practical example: Let's say you want to make a game where you control a character on the screen with the movement of your hand

Steps:

- **Training:** You record your hand in different positions (such as raising your hand, lowering it, moving it right and left)
- **Recognition:** Teachable Machine learns to associate each position of your hand with a specific movement of the character on the screen.
- **Game:** When you move your hand in front of the camera, the character on the screen moves according to what the computer has learned.

Example application:

- **Access the site:**

Open your browser and type in the search bar Teachable Machine then enter the site..

- **Select the training model:**

We find several options, choose the option related to image recognition Image

- **Preparing the camera:**

The site will ask you to choose to upload images or allow it to use your device's camera. Click on the camera. Make sure the lighting is good and the camera background is simple so that it can focus. Computer on your hand movement.

- **Computer training.**

- **Creating classes:**

Create two classes Class 1 and Class 2 at least, for example Class 1 hand raised And Class 2 hand Shaky

- **Recording Examples:** For each category, record several examples of the corresponding hand movement. For example, for the category "raised hand" raise your hand several times, each time raising it with a specific movement or a different shape, and so on for the category "shaky hand."

- **Reviewing Examples:** Make sure the examples are clear and that the computer understands the difference between the two movements.

- **Training:** After you finish taking the pictures, press the button Train Model for Computer Education Movements.

- **Test the model:** After you finish training, the site will ask you to test the model.

o Camera: Point the camera at your hand and make the movements you trained.

o Results: You will see that the computer will try to guess the movement you are making.

- **Save the model:** If you like the model, you can save it and use it in other projects

Questions and exercises for the first lesson



Put ✓ Or X :-

1. Artificial intelligence is only used in the video game industry ()
2. Artificial intelligence can help doctors diagnose diseases ()
3. Self-driving cars rely entirely on artificial intelligence ()
4. AI can learn new things slowly ()
5. Artificial intelligence is a science of computer science . ()
6. For artificial intelligence to become intelligent, it needs small amounts of information. ()
7. Artificial intelligence is only one type. ()
8. Narrow artificial intelligence can perform any task that a human can perform. ()
9. General artificial intelligence is more advanced. ()
10. General artificial intelligence focuses on performing a specific task. ()
11. Super artificial intelligence can solve specific problems. ()
12. Smart Games are used to make playing games more fun. ()
13. Instant Translator is used to facilitate communication between people. ()
14. Smart Shopping gives you suggestions for products you might like. ()
15. Natural language processing is like a machine language translator. ()
16. Robots are very good at doing a lot of things with great accuracy. ()



Lesson Two: Sensor



»»» Sensors

□ They are devices that sense changes in the surrounding environment and convert them into signals so that machines and devices can understand them and make appropriate decisions based on them. They are considered the eyes and ears of machines.

□ These simple devices play a big role in our daily lives. **Examples:** – Our smartphones, modern cars, alarms, and robots

»»» How do sensors work?

A sensor is a translator that translates those sensations (such as heat, light, or sound) into a language that the computer understands, which is the language of numbers

»»» Sensors work through 3 main steps:

Sensing

- Captures information from the surrounding environment (such as heat, light, or sound).

Signal conversion

- Converts this information into electrical signals that can be read by electronic devices.

Transmission

- Signals are sent to another device to display the results or perform a specific operation.

»»» The importance of sensors for robots:

they represent the "senses" of the robot, helping it to see, hear, sense, and even touch things around it.

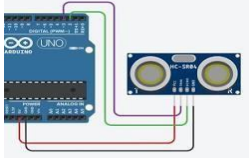
»»» Types of robotic sensors:

distance sensors Distance Sensors	Light sensors Light Sensors	Sound sensors Sound Sensors	Motion sensors Motion Sensors	Special sensors Special Sensors
Measures the distance between the robot and surrounding obstacles. This helps the robot avoid collisions 	It is used in robots that operate in places where there is variable light, like home robots. These sensors help the robot adapt to changing light conditions 	It is used in robots that interact with sounds. For example, robots that can respond to voice commands. 	Detecting motion and changes in direction, these sensors help the robot navigate and interact with surrounding objects 	Such as temperature and humidity sensors 

Some examples of electronic devices that use sensors:-

Vacuum cleaner robot	Surgical robot	Self-driving cars
Uses sensors to avoid obstacles and clean under furniture.	Uses precise sensors to perform surgeries.	It relies heavily on sensors to see the road and make decisions.

Types of distance sensors:-

	Ultrasonic sensors	Laser sensors	visible light sensors
Working principle	These devices emit high-frequency sound waves, then it receives the returning waves after they bounce off an object, and by measuring the time it takes for the wave to return, the distance to it can be calculated. Body	These devices emit a laser beam and then measure the time. The time it takes for a ray to return after bouncing off an object, and it is characterized by accuracy. High and longer range compared to ultrasound devices	These devices use digital cameras to analyze images and determine the distance to objects based on the size and distortion of the image.
Examples	Vacuum robots These devices are used to locate furniture and obstacles to avoid collision. It has parking systems : Helps measure the distance between the vehicle and surrounding obstacles. Fluid levels : Used to measure the level of liquids in tanks and reactors. 	3D laser scanners : Used to create 3D models of spaces. Ground scanning systems : Used in geological and archaeological surveys. Industrial measurement systems : used to measure dimensions with high accuracy in various industries. 	Self-driving car cameras Used to determine the distance to other vehicles and pedestrians. Traffic signals. Industrial vision systems : used in product inspection. And identify errors. Augmented reality systems : used to integrate digital elements with the real world. 

	infrared sensors	Time of Flight Sensors
Working principle	These devices emit infrared rays and then receive the rays. Return after rebounding from the body, widely used in devices Consumer Electronics	It depends on measuring the time it takes for a light pulse to reach an object and return to it. It is characterized by high accuracy and high speed
Examples	Remote Controls : Use infrared to communicate with electronic devices. Non-contact thermometers : Used to measure body temperature without the need for contact. Direct 	3D Sensor : used to create 3D models of objects. Motion tracking systems : used in video games and virtual reality systems



Factors for choosing the appropriate type of sensor

- **Required range:** The maximum distance that the device must measure.
- **Required accuracy:** The required measurement accuracy.
- **Operating environment:** The environmental conditions in which the device will operate (lighting, temperature, humidity).
- **Cost:** The cost of the device and installation.

By choosing the right device, robots and smart devices can interact with their environment more accurately and efficiently



Everyday applications of sensors :

Sensors are used daily in our lives, and the most prominent of these applications are:

- **In smart phones:** There are sensors that help in taking pictures, adjusting the lighting level, and even determining the location of the phone.
- **In modern cars:** Sensors are used to determine speed, warn of collisions, and help the driver park his car.
- **In smart homes:** Motion sensors turn on the lights automatically when someone enters the room.
- **Phone microphone:** It is a sound sensor that converts the sound you pick up into electrical signals that can be understood by the phone.
- **Motion sensor in games:** When you tilt your phone to the right or left while playing a game, the motion sensor is what tells the game to change the direction of the character.
- **Touch screen:** It is a group of small sensors that sense where your finger touches the screen.





Questions and exercises

Choose the correct answer

1. The main function of the sensor is
A. Store data B. Capture environmental changes and convert them into signals
C. Display images d. Produce sound
2. Sensors help robots to.....
A. Teach them new languages B. Allow them to interact with their environment
C. Increase their size D. Slow down their operations
3. A type of sensor is used to avoid obstacles.
A. Light sensors B. Sound sensors
C. Distance sensors D. Heat sensors
4. The first step in the operation of the sensor is
A. Transmitting B. Displaying
C. Sensing D. Transduction
- 5 are commonly used in remote controls.
A. Ultrasonic sensors B. Infrared sensors
B. C.Light sensors d . Motion sensors
6. Laser rangefinders are accurate because they use
A. Sound waves B. Visible light
C. High frequency waves D. Laser beams
7. A common application of sensors is the use of infrared in
A. Smartphones B. Remote controls
C. Vacuum cleaners D. 3D scanning
8. In which environment are light sensors useful?
A. In dark rooms B. In places with variable lighting conditions
C. In underwater environments D. In noisy factories



9. One of the sensors that are used to measure distance using high frequency sound waves is

- A. Ultrasonic sensors
- B. Laser rangefinders
- C. Infrared sensors
- D. Motion sensors

sensors are used to turn on lights when someone enters the room.

- A. Smartphone
- B. Smart car
- C. Smart Home Lighting System
- D. Smart Watch

is used for non-contact temperature measurement.

- A. Ultrasonic sensor
- B. Infrared sensor
- C. Light sensor
- D. Motion sensor

is the main purpose of the signal conversion step in sensors.

- A. Display the results
- B. Send the signals to another device
- C. Convert the information into electrical signals
- D. Turn off the sensor

helps cars determine the distance to other vehicles.

- A. Sound sensors
- B. Light sensors
- C. Infrared sensors
- D. Distance sensors

is the practical use of motion sensors in games.

- A. Change the volume
- B. Adjust the brightness of the screen
- C. Track the movements of players
- D. Improve the sound quality

15. Factors that determine the choice of a sensor for a particular application..... .

- A. Brand of the device
- B. Color of the device
- C. Environment and required accuracy
- D. Size of the device



Lesson Three: Robot



Robot

- ✓ It is a device that can be programmed to perform a set of specific tasks automatically
- ✓ The robot can move, sense **via sensors**, and interact with its surroundings
- ✓ It can be used in environments that require accuracy and speed of performance

□ **Example:** When we see a vacuum cleaner moving by itself in the house to clean the floor, this is a kind of robot. which operate independently.

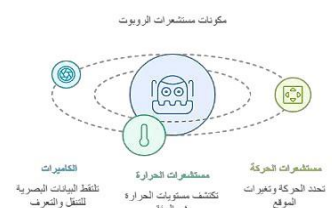
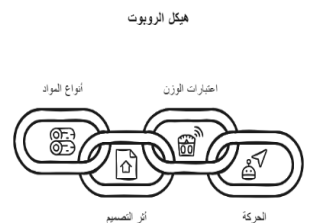
Types of robots

There are several types of robots, including:

- **Industrial robots:** They are robots used in factories, and they can perform tasks with high accuracy, such as robots that work in... Automobile factories produce production lines quickly and accurately.
- **Home robots:** These robots are found in homes, cleaning robots such as Roomba that helps you clean floors effortlessly Human like smart vacuums.
- **Medical robots:** Medical robots help doctors perform surgeries, and they can be very precise.
- **Educational robots:** These robots are used in schools to teach students how to program and technology, like LEGO robots. Mindstorms that can be programmed to perform specific tasks, to help students and to be an aid to the teacher

Robot components:

- (1) **Structure:** is the main part that carries all the components of the robot, it can be made of materials. Different materials such as metal, plastic, or carbon, the design of the frame affects the weight of the robot and its ability to move.
- (2) **Sensors:** Sensors are the robot's senses, just as we use our eyes to see and our ears to hear, The robot uses sensors to pick up information from its surroundings. Some examples of sensors:
 - o **Sound sensors:** pick up and analyze sounds.
 - o **Cameras:** Robots help "see" things in front of them



(3) Motors:

Motors are used to move the robot parts, there are different types. Different types of motors, such as electric motors and air motors, each of which has its own uses, and motors are considered artificial muscles. For robots, thanks to motors (**actuators**) robots can move and execute commands.

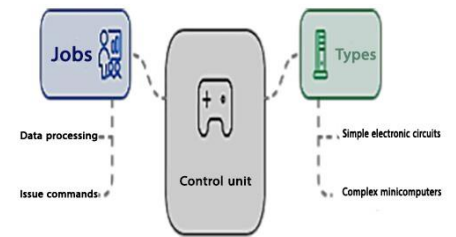
o Motors: Makes robots move.

o Robotic arm: Used in factories to move objects precisely



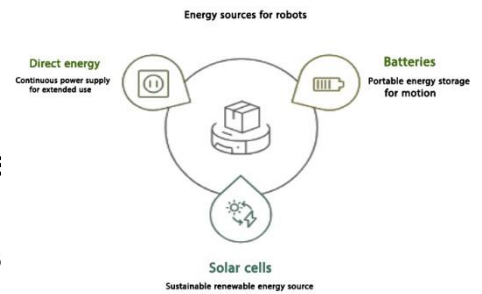
(4) The control unit

is the "**brain**" of the robot, where it processes data collected by sensors, and the commands are issued to the engines, which can be. The controller is as simple as electronic circuits. Or as complex as small computers, like thinking. Our brain when we decide to move, the processor makes the necessary decisions to move the robot.



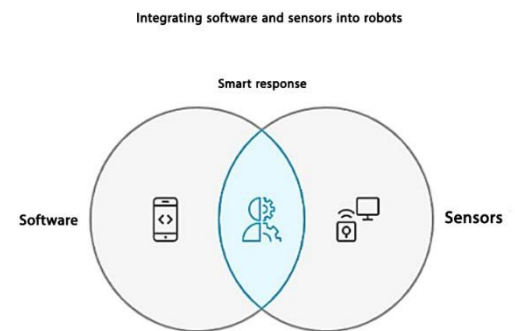
(5) Power source

Robots need a power source to operate. Power sources can be batteries, solar cells, or even power sources. Direct electricity. The choice of power source depends on the type of robot and the required operating time.

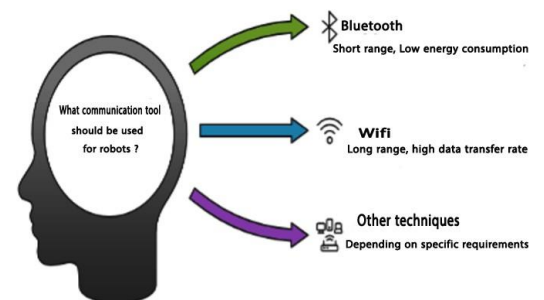


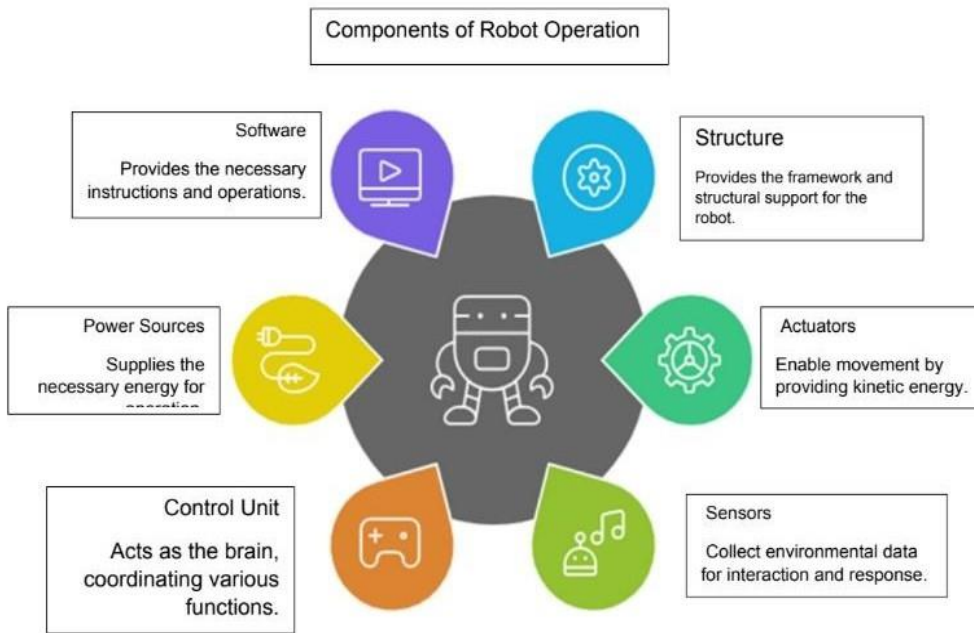
(6) Software

is what makes a robot "Smart". Software includes algorithms which determine how the robot responds. For the information it receives from the sensors. Software can range from simple programs to Artificial Intelligence Systems Complex.



(7) **Communication Tools** Robots use communication tools to interact with users or with other robots. These tools can include Bluetooth, Wi-Fi, or other communication technologies.



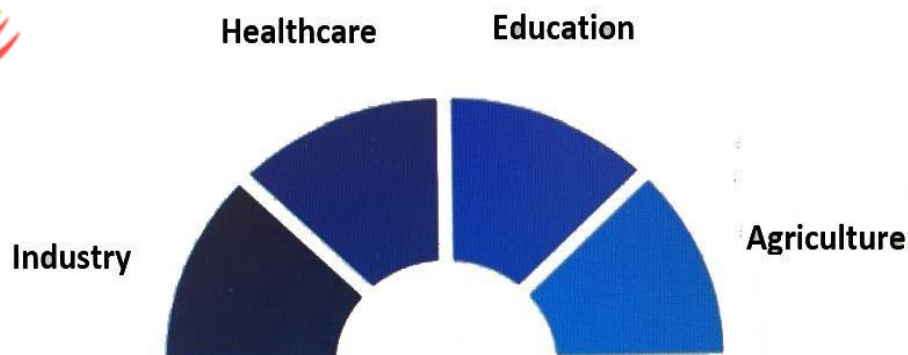


Example: A home robot, such as a robot vacuum cleaner, has sensors to avoid collisions with furniture and room walls.

»» Areas of use of robots:

- **Industry:** Improving productivity and reducing human error.
- **Healthcare:** Assisting doctors in surgeries or providing patient care.
- **Education:** Providing interactive learning experiences for students.
- **Agriculture:** Using robots in precision agriculture to increase yields and reduce waste.

Robotics Applications





» Challenges

Despite the many benefits of robots, there are challenges facing this technology, such as:

- **Security:** The need to ensure the safety of robots during work.
- **Employment:** Concern that robots may replace human labor.
- **Ethics:** Issues related to robotics and their impact on society

» Benefits of robots:–

– Increase efficiency and productivity:

- Industrial robots can work continuously without fatigue or interruption, which increases the amount of production in factories and saves time.
- In production lines, robots can perform repetitive tasks accurately and without any delay, which improves the quality of products and reduces errors.

– High accuracy and reduced errors:

- Medical robots are used in complex surgeries, helping doctors achieve greater accuracy and reduce the chances of human error.
- In the electronics industry, robots assemble small parts with precision, improving manufacturing accuracy and reducing losses due to defects.

– Safety and Security

- Robots help in dangerous tasks, such as dismantling bombs or working in hazardous environments, which reduces the risk to human lives and makes these tasks safer.
- In factories, robots can handle heavy weights and hazardous chemicals, reducing the chances of worker injury.

– Adaptation to diverse work

- Robots can be programmed to perform various tasks as needed, making them capable of performing different jobs efficiently. For example, home robots can clean or entertain.
- In the field of education, robots help students learn programming and science in an interactive way to help students and teachers



- Reduce costs in the long run

• Although the cost of manufacturing and installing robots may be high, robots reduce costs in the long run by reducing the need for human labor, achieving greater accuracy, and reducing errors and waste.

- Contribute to development

- Robots encourage technological development and open new horizons in many fields such as space, where robots are used to explore planets.
- In the field of medicine, robots contribute to advanced medical research and the development of new treatments.

Questions and exercises

Put ✓ Or X :-

1. Sensors do not play a role in the movement of robots and sensing their surrounding environment. ()
2. Robots work is limited to factories only. ()
3. Medical robots help doctors perform surgeries. ()
4. The design of the structure affects the weight of the robot and its ability to move. ()
5. Vision sensors are used to capture sounds. ()
6. The motors used in robots include electric motors and air motors. ()
7. The control unit processes the data collected by the sensors and issues commands to the motors. ()
8. Robots rely on direct energy sources only and we cannot use batteries or solar cells. ()
9. Robots do not need to use software in their work. ()
10. Robots use communication tools to interact with users or other robots. ()
11. The areas of use of robots include industry, healthcare, and education. ()

Questions and exercises



Choose the correct answer

1- The challenges facing robotics technology include.....

- A- Increased reliance on paper documents.
- B- Increased reliance on smartphones.
- C- Safety, employment and ethics.
- D- Increased reliance on traditional machines.

2- In production lines, robots can perform repetitive tasks accurately and without any delay, which leads to.....

- A- Increased efficiency and productivity.
- B- Decreased efficiency and productivity.
- C- Lack of product development.
- D- Slow production process.

3- Robots help in dangerous tasks such as.....

- A- Transportation.**
- B- Handling heavy weights and hazardous chemicals.
- C- Irrigating gardens and parks.
- D- Cleaning the house

4- To take pictures and videos, we use sensors

- A- Sound**
- B- Touch
- C- Light
- D- Vision



Lesson Four: Scratch



Scratch program:-

- It provides a very wide range of ideas that can be programmed and in which the student learns the principles of programming
- Allows students to be creative while learning and feels like they are playing a fun game while they learn
- It is a fun and easy-to-use educational tool that allows you to learn the basics of programming in a visual and fun way without having to write a lot of complex code

Features of Scratch :

Simple interface	It uses a visual interface based on blocks or commands that are placed on top of each other in a specific order and arrangement to create programs.
Educational program	Scratch is specially designed to teach basic programming concepts in a fun and engaging way.
Free software	Scratch can be downloaded from its official website and used for free
Developing creative thinking	Scratch helps learners develop their skills in creative thinking and problem-solving
Enhance problem solving skills	By trying mistakes and learning from them, students learn how to solve problems in a logical way
Developing collaboration skills	Students can work together on Scratch projects , enhancing teamwork skills
An exciting start to the world of programming	Scratch provides a strong foundation for moving on to more difficult programming languages in the future.
Share the project	Projects can be shared with others

Getting started with Scratch:

1. Download: Scratch can be downloaded for free from its official website, it can be obtained from the Internet through the link

<https://scratch.mit.edu>.

2. Explore: Explore the interface and learn how the different blocks and commands work.

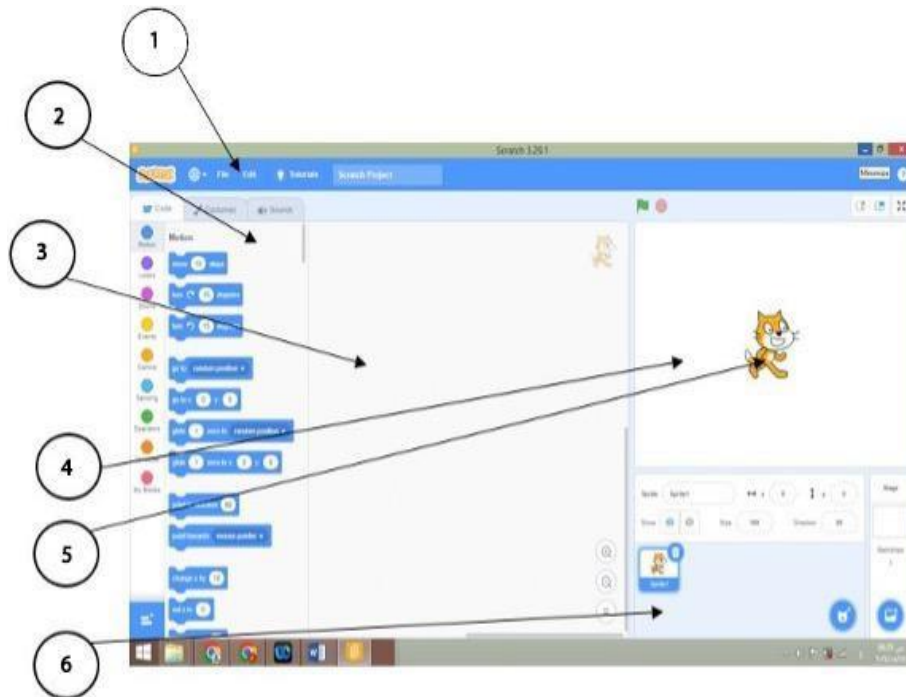
3. Create a project: Start by creating a simple project, such as animating a character or creating a short story.

4. Save the project.



»»» Download the program:

Through the following website: <https://scratch.mit.edu/download> Scratch program is downloaded



Getting to know the program interface:

1. Menu Bar.
2. Command Blocks Area.
3. Script Area (it collects programming sections "composing a group of graphical commands called blocks in a specific order").
4. Stage Area (it shows the result of the work or project).
5. Sprite object.
6. Sprites Area (it contains the objects used in the project).

»»» Change the program interface language



Project \ (What is required in the project is:

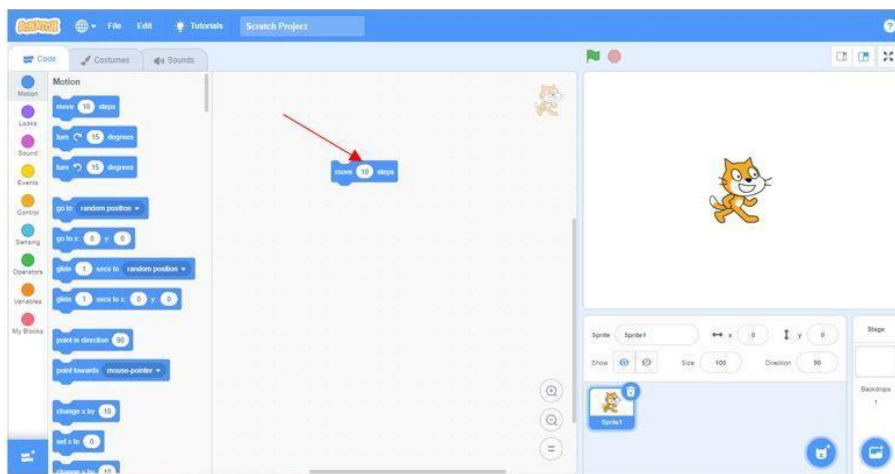
- Move the sprite (cat) on the platform or stage "30 steps".
- Then the phrase "Good morning" appears.

Project implementation:-

To be able to move the object on the platform, follow these steps

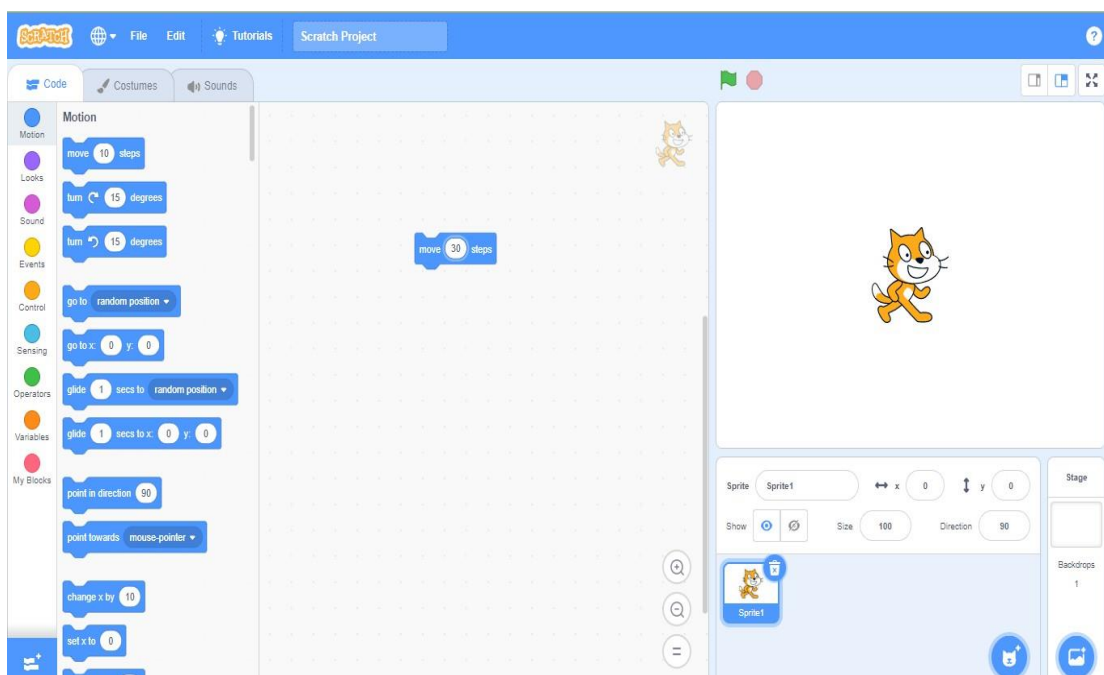
From the Blocks Area, Motion group , click and drag the command

and drop it into the Script Area  as :shown below



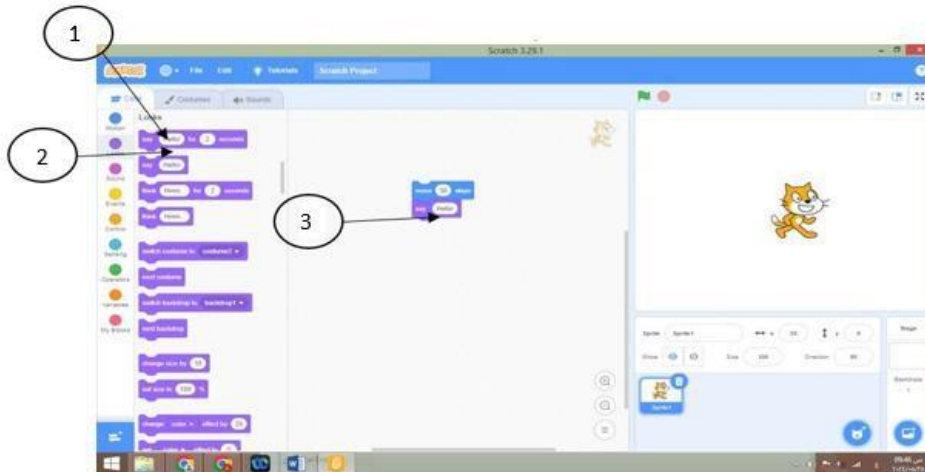
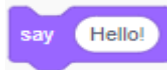
To make the object's movement steps 30 steps , double-click on the value 10 on the block(**the command**) and write the value 30 as in the following figure:

Writing the value 30 on the block as in the following figure:-



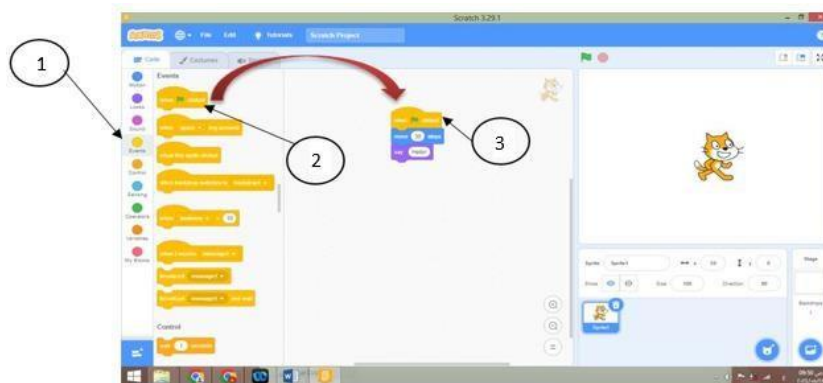
To display the phrase "Hello":

- 1- Look command set is selected
- 2- Then choose the command
- 3- Then click and drag on the order and insert it into the platform below the previous order.



To view the implementation of the project steps:-

1. In the Script Area, click on **Events Blocks**.
2. Click on the command **when green flag clicked** and drag it onto the platform
3. To be installed at the beginning of the code segment as shown in the figure:



4. To execute the project, click on the icon
5. To stop the project execution, click on the icon



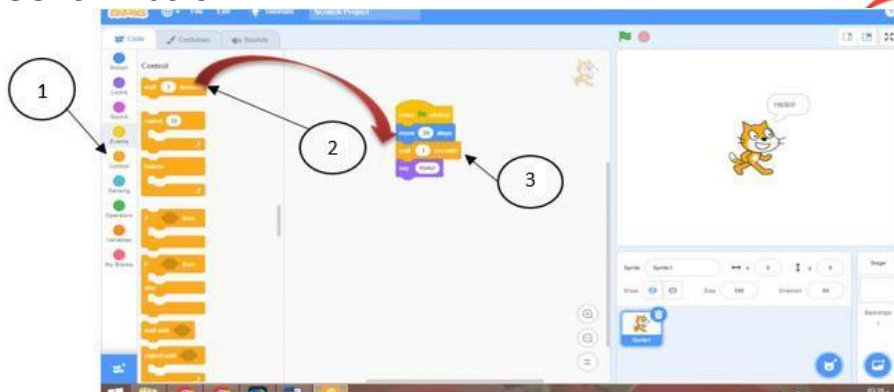
Note: When implementing the previous project, we notice that the movement was done quickly, and to address this, we can use Wait command from Control Blocks by following the following:



- 1- Click on Control Blocks
- 2- Click and drag a command
- 3- Place it as shown below:

wait 1 secs

and drop it into the Script Area



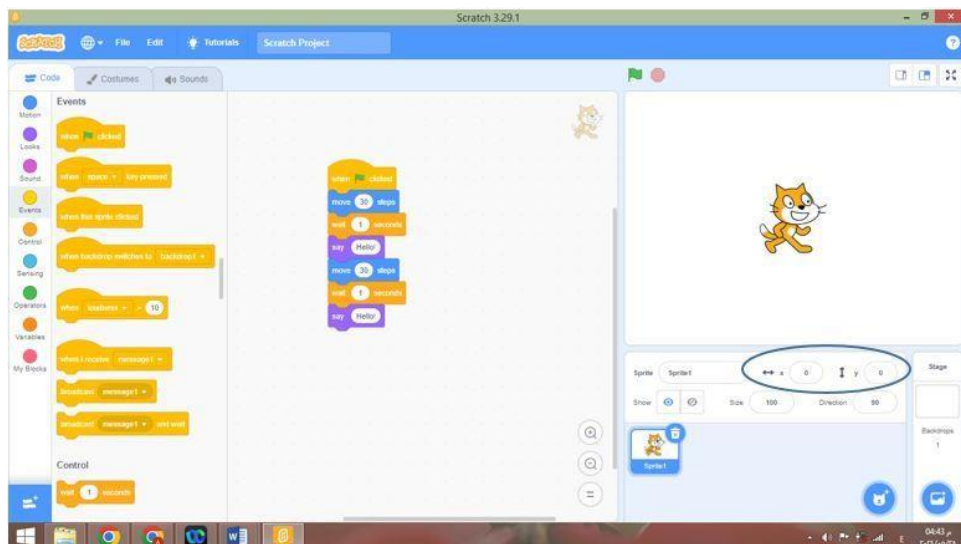
To re-execute the project, click on the icon 

Important Notes:

- The wait value represents (1 second).
- Installing a set of commands in a specific order called a **code section**.
- Use click, drag and drop to deal with any command (within) the code section.

Modify Project "1" Modify the previous project to make the movement continuous:

- To make the movement continuous, you can install the command several times
- Re-arrange it by clicking and dragging to the place where you want to start repeating.
- Modify the word "Hello" to the phrase "Good morning".



Find the platform coordinates:

Before implementing the project, the coordinates of the object on the platform are : $X=0$, which is the horizontal axis and represents horizontal movement , $Y=0$ which is the vertical axis and represents vertical movement.



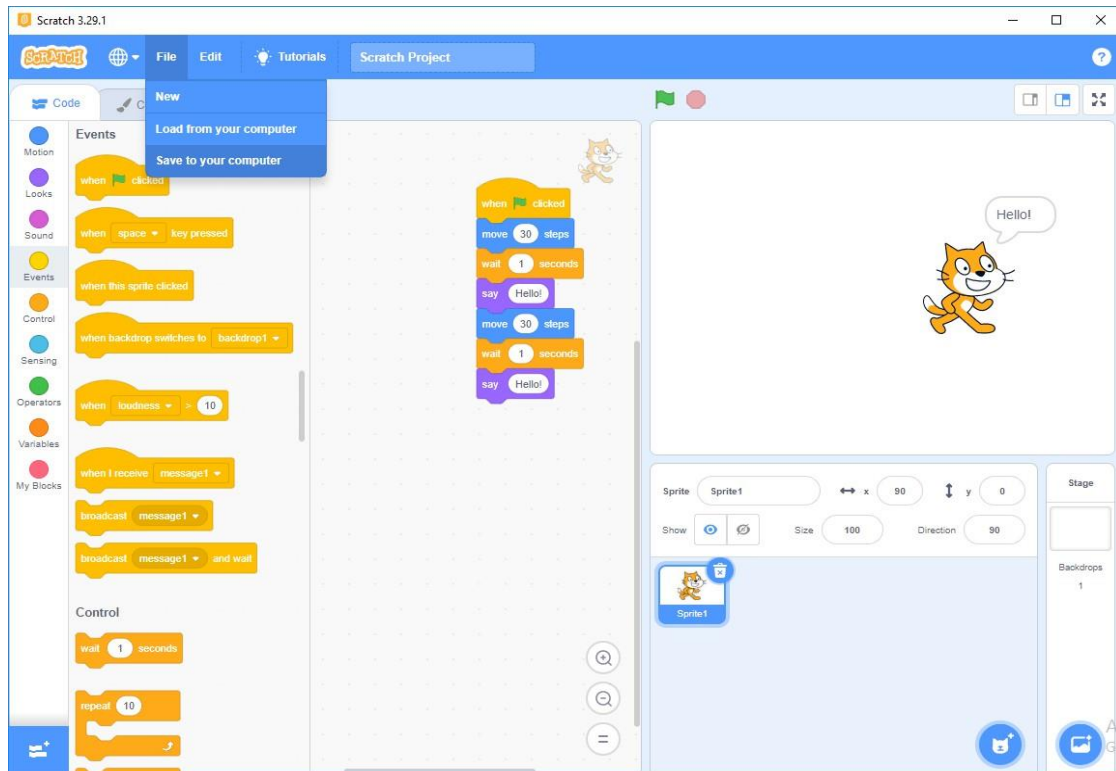
➤ Execute the project. Note that the value $X=0$ and the value $Y=0$ after executing the project.

➤ Sprite position change can be controlled. On the platform by clicking on it and (drag and drop) Drop . to another location on the platform

❑ Save the project in a file :

- 1- From the File menu, choose Save to your computer.
- 2- Select a location to save the file on one of the storage media.
- 3- Type the file name "Project 1"

Note: The file extension is Sb3



Questions and exercises



Put ✓ or X

- 1- The Scratch program provides a very wide range of ideas that can be programmed. ()
- 2- The Scratch program helps the student learn the principles of programming ()
- 3- The Scratch program is considered a difficult educational tool to use. ()
- 4- The student in the Scratch program needs to write a lot of complex codes. ()
- 5- Scratch uses a visual interface based on blocks. ()
- 6- The Scratch program is paid. ()
- 7- In the Scratch program, students face difficulty in sharing projects with others. ()
- 8- In the Scratch program, the Stage area shows the programming sections. ()
- 9- In the Scratch program, the result of the work or project appears in the Area Blocks area. ()

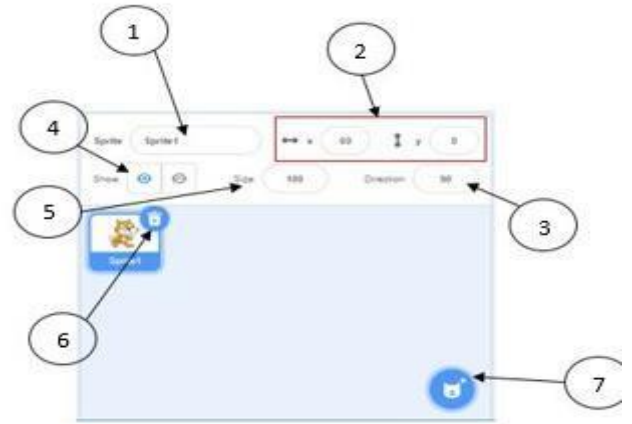


Lesson 5 Sprite area in Scratch



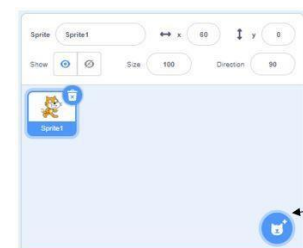
➤➤➤ **Sprites area** (contains the sprites used in the project)

- 1- The name of the sprite (you can modify it by clicking on it and renaming it).
- 2- The location of the sprite and determines it (the horizontal axis is the X values and the vertical axis is the Y values, note the current location of the sprite (cat) on the platform is ((60,0)
- 3- The direction of the sprite's movement: (You can change the direction by **changing the Direction value**).
- 4- Show or hide the sprite on the platform.
- 5- The size of the sprite and its value can be changed.
- 6- Delete the sprite from the platform.
- 7- Add a new sprite Choose Sprite.



➤➤➤ **Add a new sprite:**

- Click on -Choose Sprite



-Choose Basketball



- Remove the cat object from the stage



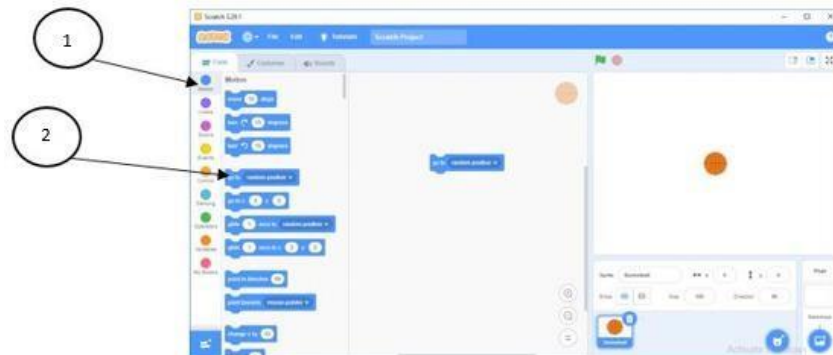
Project 2:

Required to move the ball randomly on the platform while making a sound for the ball and repeating this 10 times

Project creation steps:

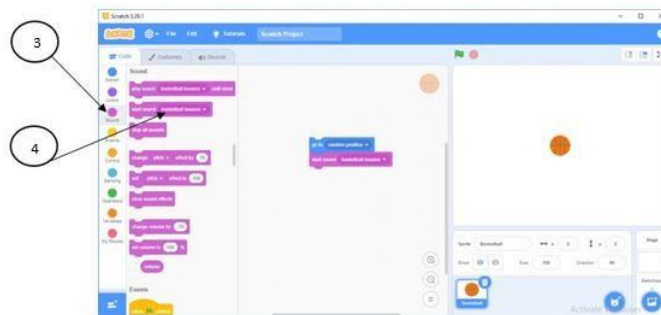
1-From Motion

2-Choose the Go to random position command



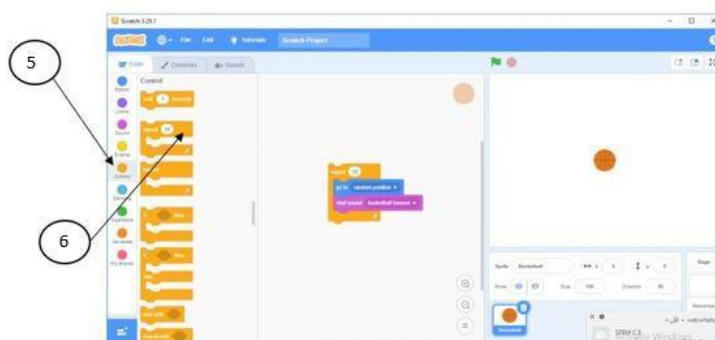
3-From Sound

4-Choose the command Play sound



5-To repeat the movement 10 times from Control

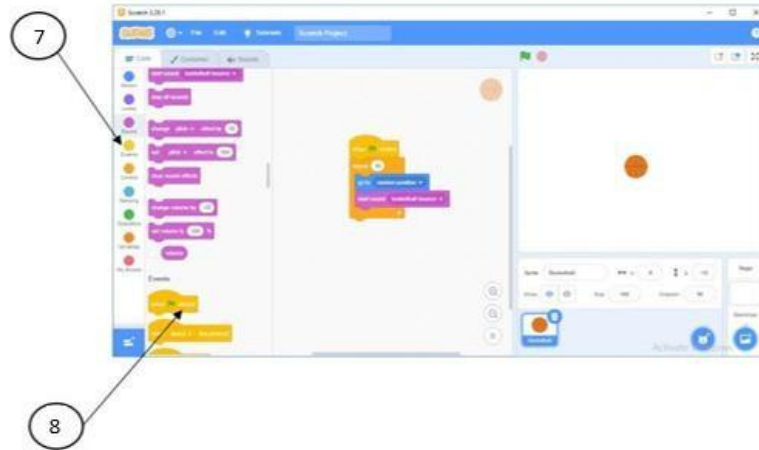
6-Choose the Repeat command.



7-From Events

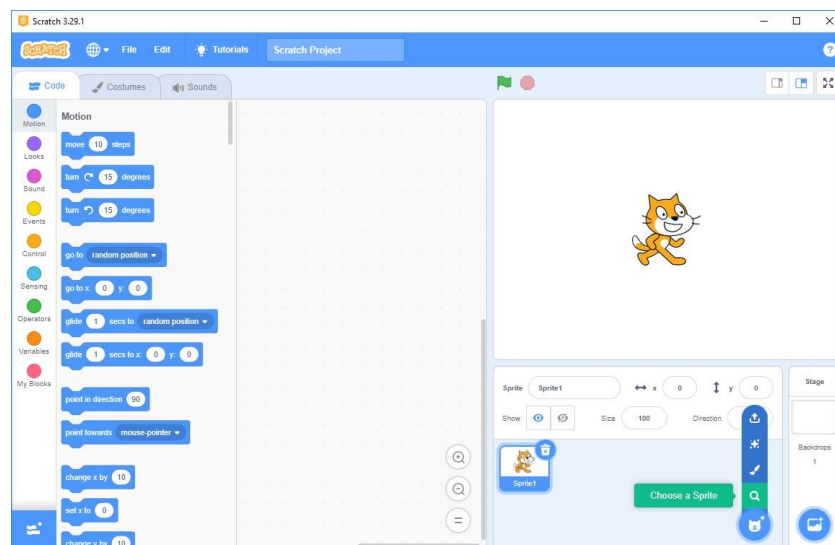
8-Choose the "When Clicked command"

9- Test the execution of the project

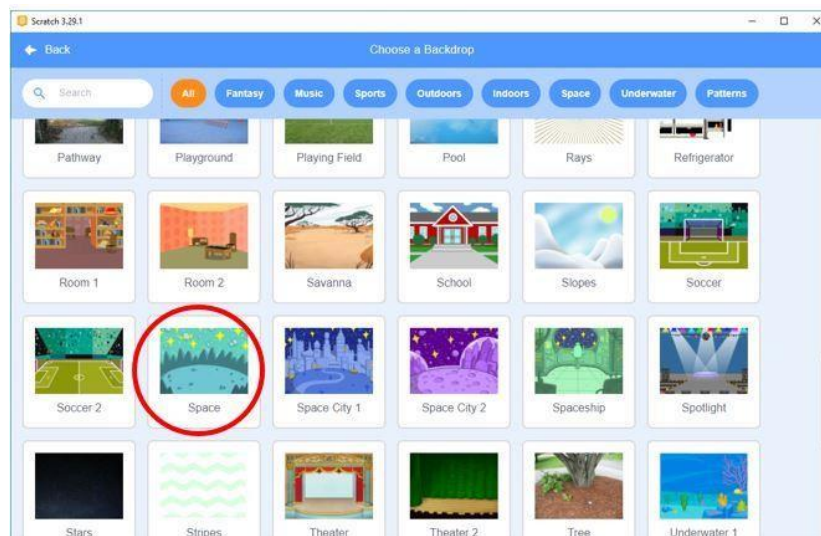


Project (3) Spaceship

-Insert a new sprite Rocketship



-Insert a new background by clicking on Choose a Backdrop, browse through the different backgrounds and then choose "Space".



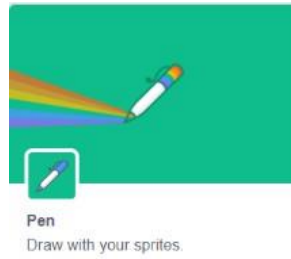
Square Drawing Project:

Square Drawing Project:

1. **Open a new project:** Open Scratch and start a new project.
2. **Select the pen:** We will use the "pen" to draw our picture. In the code area, find the "pen" section and drag the "pen" block down. This block will make the pen start drawing

note:

By clicking on Add Extension the pen blocks will appear as shown in the figure.



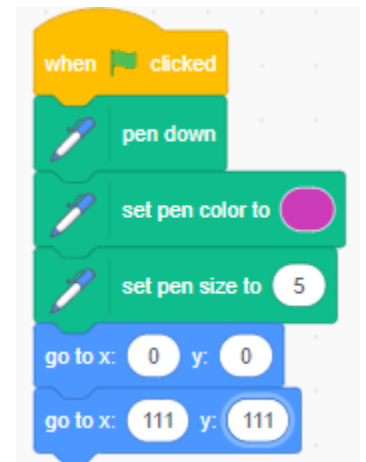
Blocks will appear as shown in the opposite figure:

3. **Setting Color and Size:** Before you start drawing, you can set the line color and size using the blocks in the "Pen" section. For example, you can use the "Set Pen Color to" block to choose a specific color, and the "Set Pen Size to" block to set the line thickness.
4. **Moving the Pen:** Now, we will move the pen to draw the shape we want. Use the "Go to x:y:" block to set the starting point, and then use the "Go to x:y:" block again to set the ending point. This will make the pen draw a straight line between the two points.

5. **Repeating Steps:** Repeat the previous steps to draw more lines and form the shape you want.

Notes:

- **Drawing different shapes:** You can draw any geometric shape by setting the start and end points of the lines appropriately.
- **Adding details:** You can add details to your images such as eyes, mouth, and ears.



Project: Drawing a circle

To draw a circle, you can use the "Repeat" block to repeat the process of drawing short lines at different angles, this helps with the circle drawing effect.

Questions and exercises



()

()

Put ✓ or X:-

1. The sprites used in the project appear in the Sprites area. ()
2. The sprite name can be modified only once. ()
3. The location of the sprite on the platform is determined by the value of the horizontal axis X only. ()
4. The horizontal and vertical axis are used to know the current location of the sprite on the platform. ()
5. To modify the name of the sprite, click on its current name and rename it. ()
6. The direction of the sprite's movement can be changed by clicking on the word Direction. ()
7. The sprite can be shown or hidden on the platform by clicking on Choose Sprite. ()
8. The size of the sprite is changed by its value in the Sprites area. ()
9. The sprite can be deleted from the platform. ()
10. Only one sprite can be added to the platform. ()
11. To add a new sprite, click on Choose Sprite. ()
12. The Stop command is used to watch the project execution. ()
13. A new background is inserted for the project through the programming area. ()
14. The Start command is used to stop the project. ()
15. We use the coordinates (x, y) to locate the point on the stage ()



Lesson Six: Principles of Python



Python language definition:-

The first version of the language was in 1991 .

It is a programming language it is widely used in:-

- Data Science
- In machine learning,
- For website and application development

Features of Python language:

1- Open source: Python is free and open source, allowing everyone to use and develop it.

2. Interpreted language: Which means that it **translates programming codes** line by line, so if there are errors in the program code, it will stop working, as programmers can quickly find errors in the codes.

3. Versatility: It can be used in developing web applications, data science, artificial intelligence, machine learning, and game programming.

4. Easy-to-use language: It is one of the easiest programming languages for beginners because of its simple and organized formula and uses words similar to English, unlike other programming languages.

5. Integration: Python can be integrated with other languages such as C, C++, and Java, and it can also be used in developing multi-platform programs.

6. Libraries: Python has many libraries that you can use.

Python Libraries

They are pre-built codes and functions that help programmers perform specific tasks without having to write codes from scratch, libraries are a powerful tool that increases the efficiency and effectiveness of programming using Python, as they provide ready-made solutions to many common problems or requirements.

like:

NumPy: is a library widely used in data science, statistics, and artificial intelligence.

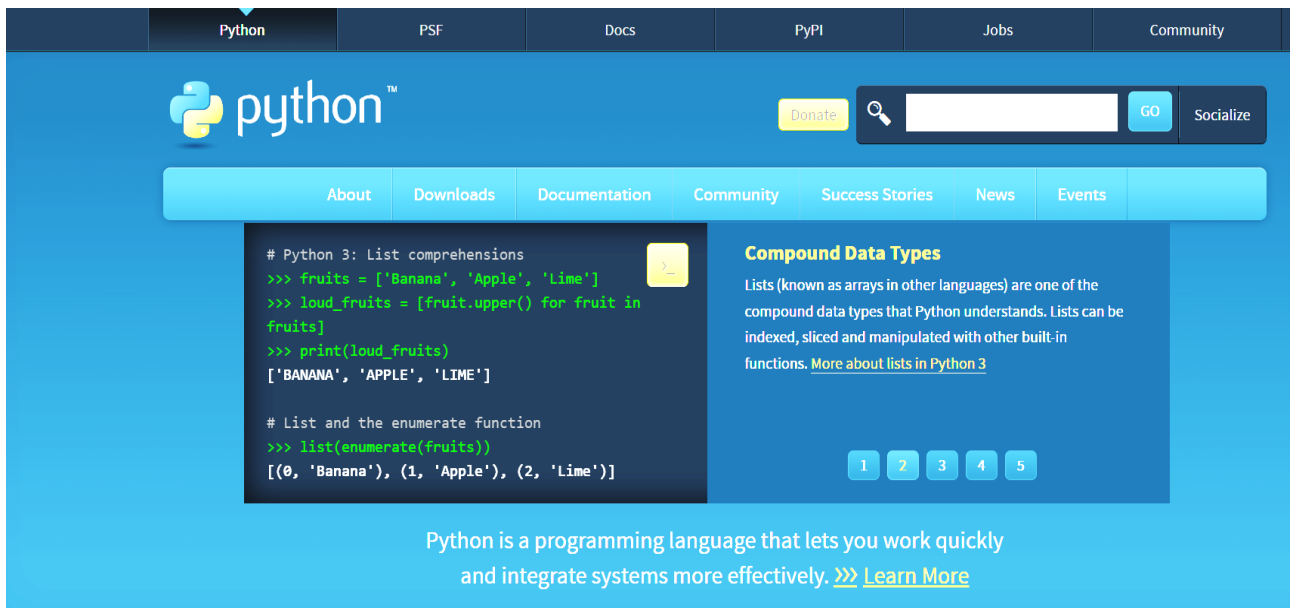
Pandas: is a library for analyzing and processing data.

Matplotlib: is a library for creating graphs and charts

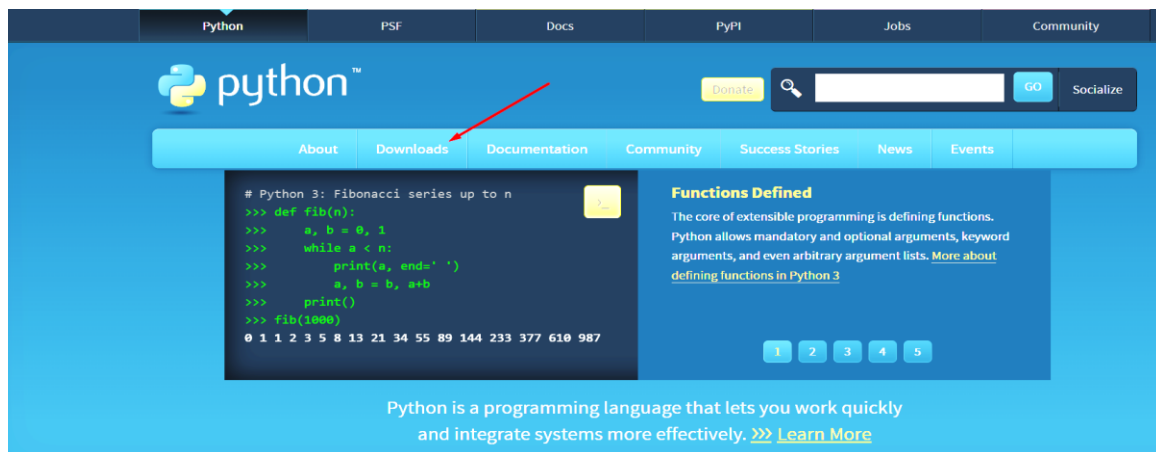
How to download the program from the official website:



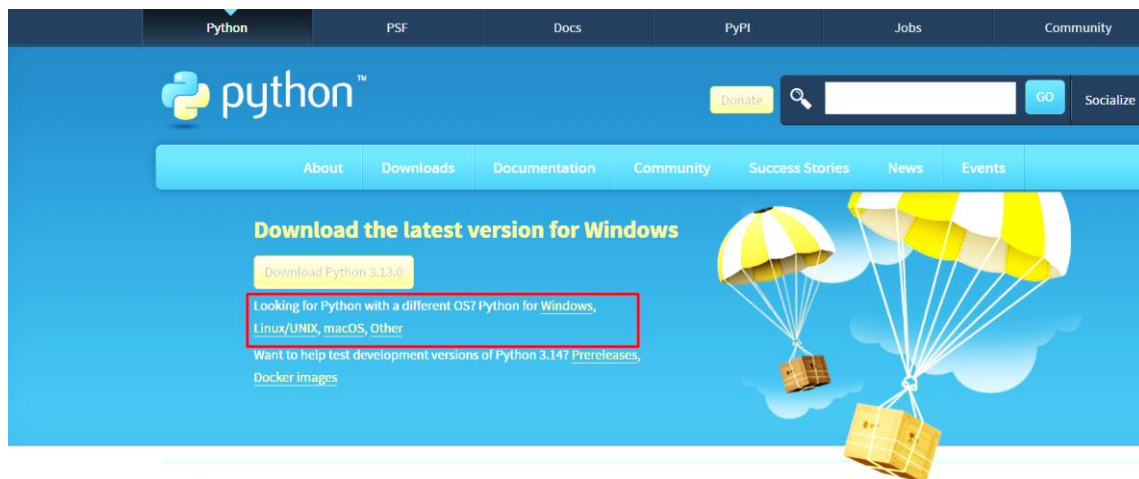
1. Visit the official Python website www.python.org



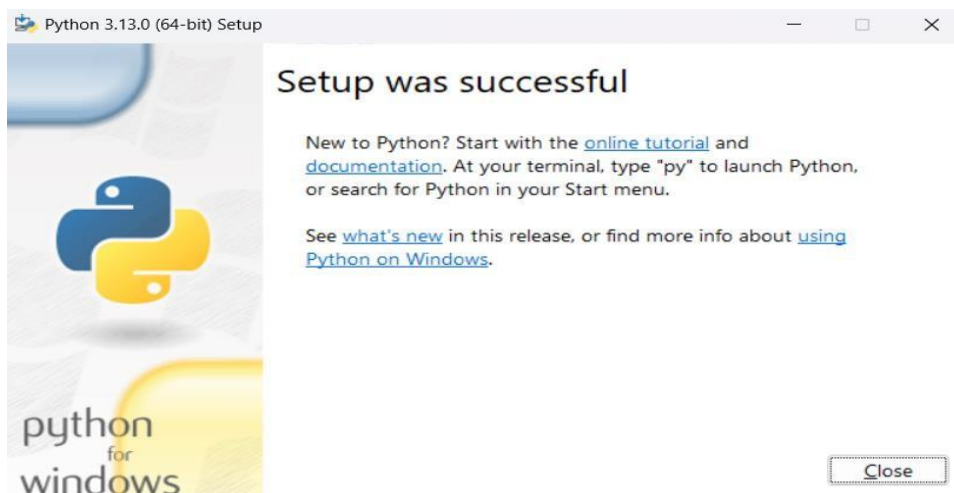
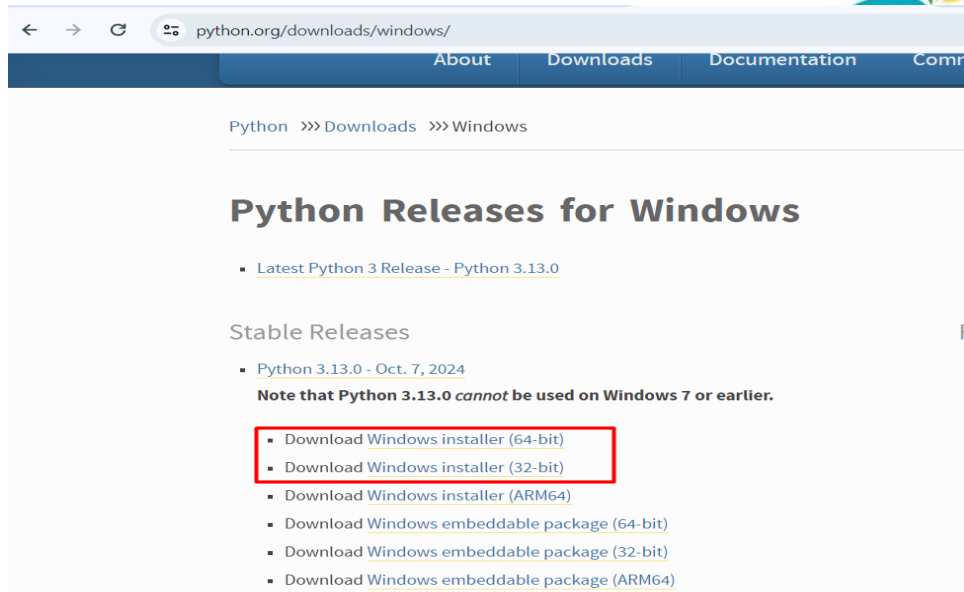
2. Select "Downloads"



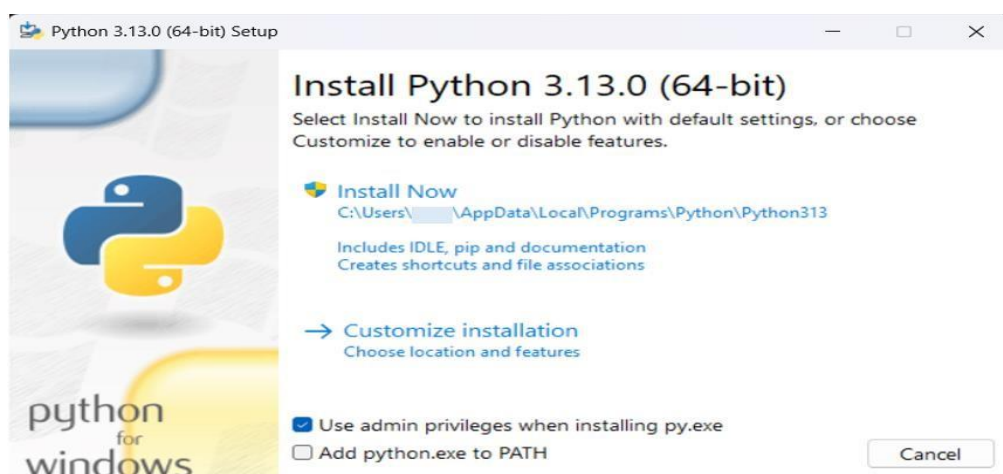
3. Then choose the system you are working on (Windows, Mac, or Linux).



4- You must choose 64 bit or 32 bit, according to your device specifications.



5-After downloading, install the program on your device and follow the instructions



Questions and exercises



Put ✓ or X:-

1. Python is a free and open-source language, which does not allow anyone to develop it. ()
2. It is not permissible to create applications and websites in Python. ()
3. Python uses data science and machine learning. ()
4. Python is an interpreted language because it translates programming codes line by line. ()
5. Python is used in developing web applications, data science, artificial intelligence, machine learning, and game programming. ()
6. Python is one of the most difficult programming languages. ()
7. Python can be integrated with other languages such as C, C++, and Java. ()
8. One of the disadvantages of Python is the lack of libraries that you can use. ()
9. NumPy: A library used in data science, statistics, and artificial intelligence. ()
10. Pandas: A library for analyzing and processing data. ()

Download Python from the official website and arrange the following steps in the correct order.

- 1- You must choose 64bit or 32bit, depending on your device specifications.
- 2- Visit the official Python website www.python.org
- 3- Choose the system you are working on (Windows, Mac, or Linux).
- 4- After downloading, install the program on your device and follow the instructions.
- 5- Choose "Downloads"

Lesson 7: Variables in Python



Definition of variables–: Variables in programming languages express a reserved place in memory to store and save a specific value, where the value can change (example: `Taher= 20`) In this example, we expressed a variable named (`Taher`) and its value is equal to (`20`), where you can change the value of the variable while dealing with the program immediately during the execution of the program

Conditions for naming variables in Python:

1. The variable name begins with a letter or an underscore _.
2. The change name contains letters (A–Z) or numbers or an underscore _
3. Reserved words may not be used in Python because they express specific values that the program understands (example: `False`) A reserved word within the program is a word that indicates a reserved value (logical value)

Note When writing a variable name, you must take into account placing the variable names in upper and lowercase letters (example: `TAHER`, `Taher`, `taher`, `TaheR`) In the previous example, the variable names refer to four variables and not one variable.

Types of variables in Python

1- Numbers: Used to store numerical values such as integers (`int`) and decimals (`float`).

Integer variables:

`X=5`

`– Y=10`

Decimal variables:

`Z=`

`5.25`

`A=`

`8.32`

2- Strings: Used to store texts such as names and addresses.

Texts are placed between single quotes ‘ ’ or double quotes “ ”

`Name=“Taher”`

`City=‘Cairo’`

3- Booleans: A data type that contains only two values `True` or `False`

Often used in comparisons and decision making in codes

`Is_taher_student=False`

`Is_taher_a_teacher=True`

Python program interface

- 1- Through the interactive Python Shell interface, you can write **simple** codes and execute them directly to see the results.
- 2- The Text Editor allows you to write longer, more complex codes and save them for later execution

Print function() In Python it is one of the most used functions, as it is used to display text or values on the output screen and can be used to display text, variables, or even the results of mathematical operations

Questions and exercises



Put ✓ or X:-

1. Variables in programming languages are a reserved place in memory to store and save a specific value. ()
2. The variable name must not begin with a letter or an underscore sign `_`. ()
3. TAHER, Taher, tahir, TaheR are 4 names for variables in the Python language. ()
4. The change name contains letters (A-Z) or numbers or an underscore sign ()
5. When naming variables, reserved words in the Python language may be used ()
6. `Y = 10` The statement type of the variable Y is numeric for an integer. ()
7. `City = "Cairo"` The statement type of the variable City is text. ()
8. `Is_taher_student = False` The statement type of the variable Is_taher_student is logical. ()
9. To know the type of the variable, we do not need to use the type function. ()
10. The texts of variables are placed between single quotation marks or double quotation marks. ()

Choose the correct answer

1. The function ... is used to display texts or values on the output screen
 - A. `Cos( )`
 - B. `Type( )`.
 - C. `Print( )`.
 - D. `Sn( )`.
2. value of the variable is placed between the signs
 - A. `'''`
 - B. `<>`.
 - C. `>=`.
 - D. `=<`.
3. To display texts, variables, or even the results of mathematical operations, we use the function
 - A. `Cos( )`
 - B. `Type( )`.
 - C. `Print( )`.
 - D. `Sin( )`.
4. To know the type of the variable statement, we use the function
 - A. `Cos( )`
 - B. `Type( )`.
 - B. `Print( )`.
 - D. `Sin( )`



Answer Key of the Textbook

Lesson1

Put ✓ or X:-

1	X	10	X
2	✓	11	X
3	✓	12	✓
4	X	13	✓
5	✓	14	✓
6	X	15	✓
7	X	16	✓
8	X		
9	X		

Lesson2

Put ✓ or X:-

1	Capture environmental changes and convert them into	9	Ultrasonic sensors
2	Allow them to interact with their	10	Smart Home Lighting System
3	Distance sensors	11	Infrared sensor
4	.Sensing	12	Convert the information into electrical signals
5	Infrared sensors	13	Distance sensors
6	Laser beams	14	Track the movements of players
7	Remote controls	15	Environment and required accuracy
8	In places with variable lighting conditions		

Lesson3

A-Put ✓ or X:-

B- Choose the correct answer

1	✓	1	Safety, employment and ethics
2	X	2	Increased efficiency and productivity
3	✓	3	Handling heavy weights and hazardous chemicals
4	✓	4	Vision
5	X		
6	✓		
7	✓		
8	X		
9	X		
10	✓		
11	✓		



Lesson4

–:Put or X

1	√	6	X
2	√	7	X
3	X	8	X
4	X	9	X
5	√	10	√

Lesson5

–:Put or X

1	√	9	√
2	X	10	X
3	X	11	√
4	√	12	X
5	√	13	X
6	√	14	X
7	X	15	√
8	√		

Lesson6

–: Put or X–l				Download Python from the official website and arrange the following steps in the correct order
1	X	6	X	1- Visit the official Python website www.python.org
2	X	7	√	2- Select "Downloads"
3	√	8	X	Then choose the system you are working on (Windows, Mac, or Linux)
4	√	9	√	4- You must choose 64 bit or 32 bit, according to your device specifications.
5	√	10	√	5-After downloading, install the program on your device and follow the instructions

Lesson7

A–:Put or X				B–Choose the correct answer	
1	√	1		Print()	
2	X	2		" "	
3	√	3		Print()	
4	√	4		type()	
5	X				
6	√				
7	√				
8	√				
9	X				
10	X				